

An estimation of paediatric respiratory in-patient casemix in all HA hospitals 2008-2012

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Data search was conducted using the Hospital Authority (HA) Clinical Data Analysis & Reporting System (CDARS) to capture annual hospital discharges statistics (from Jan 1 – Dec 31 each year, inclusive) for recent 5 years (2008-2012) in paediatric specialty with specialty codes of NEO (NIC), NEO (SCB), NUR (NUR), PAE (Gen PAE) and PAE (PIC) from 16 HA hospitals (AHNH, CMC, DKC, KWH, NDH, OLM, PMH, POH, PWH, PYN, QEH, QMH, TKO, TMH, UCH and YCH) with principal diagnosis codes (ICD-9CM) as 460-519 (respiratory system). The total discharges and deaths were as follows:

	2008	2009	2010	2011	2012	Yearly average
Inpatient discharges episodes (A)	18808	20662	22824	20721	23237	21250.4
Inpatient discharges headcounts (B)	16481	18404	19830	17768	20237	18544
Inpatient deaths (C)	16	16	20	19	16	17.4
Inpatient discharges & deaths episodes (A+C)	18824	20678	22844	20740	23253	21267.8
Inpatient discharges & deaths headcounts (B+C)	16497	18420	19850	17787	20253	18561.4

Details of diagnostic groupings were as follows (in descending order of frequency):

Principal Diagnosis		Inpatient Discharges & Deaths (Episodes)							
ICD-9CM Code	Diagnosis Description	2008	2009	2010	2011	2012	5-Year Total	Group Total	Yearly Average
Upper Respiratory Tract Infections									
465.9	Acute URI NOS	6552	6083	6257	6251	7128	32271		
463	Acute Tonsillitis	523	406	629	783	756	3097		
462	Acute Pharyngitis	681	448	427	574	459	2589		
460	Acute Nasopharyngitis	3	1	6	7	1	18		
464.0	Acute Laryngitis	2	7	5	2	2	18	37993	7598.6
Pneumonia									
486	Pneumonia, Organism NOS	2863	2499	5041	2826	3865	17094		
480.1	Resp Syncyt Viral Pneum	238	230	437	407	367	1679		
483.0	Pneu Mycplsm Pneumoniae	84	75	377	137	221	894		
487.0	Influenza With Pneumonia	34	116	132	93	192	567		
480.9	Viral Pneumonia NOS	92	70	137	133	118	550		
480.2	Parinfluenza Viral Pneum	30	63	88	86	84	351		
482.2	H.Influenzae Pneumonia	40	21	86	51	109	307		
481	Pneumococcal Pneumonia	41	39	64	78	83	305		
480.0	Adenoviral Pneumonia	13	6	62	89	37	207		
482.1	Pseudomonal Pneumonia	15	20	35	43	30	143		
480.8	Viral Pneumonia NEC	5	28	31	10	18	92		
482.30	Streptococcal Pneumonia NOS	12	18	19	15	21	85		
482.83	Pneumo Oth Grm-Neg Bact	2	6	10	17	24	59		
482.4	Staphylococcal Pneumonia	3	11	15	7	16	52		
482.0	K. Pneumoniae Pneumonia	2	7	15	4	13	41		
482.82	Pneumonia E Coli	2	6	7	1	10	26		
482.32	Pneumonia Strptococcus B	3	2	4	4	2	15		
482.31	Pneumonia Strptococcus A			1	1	6	8	22475	4495
Acute bronchiolitis									
466.19	Ac Bronchiol D/T Oth Org	1901	1658	2277	2278	2426	10540		
466.11	Ac Bronchiolitis -RSV	901	586	856	1142	1026	4511	15051	3010.2

Principal Diagnosis		Inpatient Discharges & Deaths (Episodes)							
ICD-9CM Code	Diagnosis Description	2008	2009	2010	2011	2012	5-Year Total	Group Total	Yearly Average
Asthma									
493.90	Asthma W/O Status Asthm	2111	1891	2349	2431	2134	10916		
493.00	Ext Asthma W/O Stat Asth	143	128	178	105	92	646		
493.91	Asthma W Status Asthmat	15	15	31	19	10	90		
493.01	Ext Asthma W Status Asth	5	9	3	2	1	20	11672	2334.4
Influenza									
487.1	Flu W Resp Manifest NEC	1212	4688	1298	1256	1835	10289		
487.8	Flu W Manifestation NEC	2	3	1	1	59	66	10355	2071
Large Airway Acute Infections									
464.4	Croup	522	695	703	597	832	3349		
464.20	Ac Laryngotrach No Obstr	2		4	3		9		
464.21	Ac Laryngotrach W Obstr		1	2		3	6		
464.10	Ac Tracheitis No Obstruc	2			1	2	5		
464.30	Ac Epiglottitis No Obstr	1	2		1	1	5		
464.10	Ac Tracheitis No Obstruc		1				1		
464.11	Ac Tracheitis W Obstruct					1	1		
465.0	Acute Laryngopharyngitis			1	1		2	3378	675.6
Bronchitis									
466.0	Acute Bronchitis	280	281	364	536	527	1988		
490	Bronchitis NOS	98	104	144	195	153	694		
491.8(1)	Bronchiolitis Obliterans	13	12	9	10	11	55	2737	547.4
Respiratory Failure									
518.81	Respiratory Failure	12	73	334	193	152	764	764	152.8
Pneumothorax									
512.8	Spont Pneumothorax NEC	130	133	148	113	133	657		
512.0	Spont Tens Pneumothorax		2	3	5	4	14	671	134.2
Aspiration Pneumonia									
507.0	Food/Vomit Pneumonitis	39	44	33	39	41	196	196	39.2
Large Airway Diseases									
519.1	Trachea/Bronchus Dis NEC	10	19	35	23	19	106		
478.74	Stenosis Of Larynx	3	4	6	1	10	24		
478.79	Disease Of Larynx NEC	2	4	5	1	8	20		
478.32	Vocal Paral Unilat Total			3	2	4	9		
478.34	Vocal Paral Bilat Total	3	4	1			8		
478.30	Vocal Cord Paralysis NOS			3	2	2	7		
478.70	Disease Of Larynx NOS	3					3		
478.5	Vocal Cord Disease NEC	1		1			2		
478.6	Edema Of Larynx		1				1		
478.70	Disease Of Larynx NOS		1				1		
478.75	Laryngeal Spasm		1				1		
478.33	Vocal Paral Bilat Part			1			1		
478.4	Vocal Cord/Larynx Polyp	1					1	184	36.8
Rhinitis									
477.9	Allergic Rhinitis NOS	31	33	31	26	47	168		
472.0	Chronic Rhinitis	3	3	3	1	1	11		
477.8	Allergic Rhinitis NEC		1			2	3	182	36.4
Sinusitis									
461.9	Acute Sinusitis NOS	18	15	15	15	25	88		

Principal Diagnosis		Inpatient Discharges & Deaths (Episodes)							
ICD-9CM Code	Diagnosis Description	2008	2009	2010	2011	2012	5-Year Total	Group Total	Yearly Average
461.0	Ac Maxillary Sinusitis	3	3	8	6	6	26	143	28.6
478.1	Nasal & Sinus Dis NEC	5	2	1		2	10		
473.0	Chr Maxillary Sinusitis	3	1	1		2	7		
473.9	Chronic Sinusitis NOS		1			2	3		
473.2	Chr Ethmoidal Sinusitis			2			2		
461.1	Ac Frontal Sinusitis				1	1	2		
473.1	Chr Frontal Sinusitis	1	1				2		
461.2	Ac Ethmoidal Sinusitis	1					1		
461.3	Ac Sphenoidal Sinusitis					1	1		
473.3	Chr Sphenoidal Sinusitis	1					1		
Nose & Throat Diseases									
474.10	Hypertrophy T And A	6	14	9	12	15	56	142	28.4
474.12	Hypertrophy Adenoids	3	5	10	7	13	38		
474.11	Hypertrophy Tonsils	5	5	3	2	8	23		
474.0	Chronic Tonsillitis	1	2	1	1	2	7		
474.9	Chr T & A Dis NOS	1	1	1	2		5		
478.0	Hypertroph Nasal Turbinat	1		1	2		4		
470	Deviated Nasal Septum			2		1	3		
471.0	Polyp Of Nasal Cavity		2				2		
471.9	Nasal Polyp NOS		1				1		
478.25	Edema Pharynx/Nasopharyx			1			1		
478.26	Cyst Pharynx/Nasopharynx	1					1		
474.8	Chr T & A Dis NEC				1		1		
Non-specific Respiratory System Diseases									
519.8	Resp System Disease NEC	11	11	29	27	17	95	100	20
519.9	Resp System Disease NOS	3			1	1	5		
Abscesses & Empyema									
478.24	Retropharyngeal Abscess	3	5	1	5	6	20	72	14.4
475	Peritonsillar Abscess	3	2		4	2	11		
478.22	Parapharyngeal Abscess		1	2	1	5	9		
513.0	Abscess Of Lung	8	3	3	1		15		
510.9	Empyema W/O Fistula	5	3	1	3	5	17		
Bronchiectasis									
494	Bronchiectasis	17	8	13	7	5	50	50	10
Pleural Effusion									
511.9	Pleural Effusion NOS	7	4	4	8	3	26	41	8.2
511.8	Pleural Effus NEC Not Tb		2	2		5	9		
511.1	Bact Pleur/Effus Not Tb	3		1	1		5		
511.0	Pleurisy W/O Effus Or Tb				1		1		
Other Lung Diseases									
518.89	Restrictive Lung Disease	5	7	5	11	11	39	39	7.8
Emphysema									
518.1(0)	Interstitial Emphysema	1	1					29	5.8
518.1(1)	Pneumomediastinum	5	9	4	3	6	29		
Atelectasis									
518.0	Pulmonary Collapse	6	3	3	8	3	23	23	4.6
Adult Respiratory Distress Syndrome (ARDS)									
518.82	Other Pulmonary Insuff	1	3	2		2	8	8	1.6

Principal Diagnosis		Inpatient Discharges & Deaths (Episodes)							
ICD-9CM Code	Diagnosis Description	2008	2009	2010	2011	2012	5-Year Total	Group Total	Yearly Average
Miscellaneous									
496	Chr Airway Obstruct NEC	3	1				4	4	0.8
495.9	Allerg Alveol/Pneum NOS	2			2		4	4	0.8
519.0	Tracheostomy Complic			3	1		4	4	0.8
478.8	Urt Hypersens React NOS	1	1	1	1		4	4	0.8
492.0	Emphysematous Bleb	1	1			2	4	4	0.8
491.9	Chronic Bronchitis NOS					3	3	3	0.6
519.4	Disorders Of Diaphragm	1		1		1	3	3	0.6
516.3	Idio Fibros Alveolitis	2			1		3	3	0.6
519.3	Mediastinum Disease NEC			1	1		2	2	0.4
516.9	Alveol Pneumonopathy NOS		1		1		2	2	0.4
506.0	Fum/Vapor Bronc/Pneumon			1			1	1	0.2
Grand Total :		18824	20678	22844	20740	23253	106339	-----	21267.8

All diagnostic investigations and therapeutic procedures coded in this group of patients were then listed out in order to classify cases into simple, intermediate, complex and highly complex groups according to the proposed criteria of categorization of case complexity as far as possible:

Categorization of case complexity*	Disease factors		Treatment factors	
	Disease Severity (A)	Disease Complications (B)	Level of Care / Isolation (C)	Procedures (D)
Simple	mild	nil	clinic / ambulatory / general ward care, isolation: nil / contact / droplets	nil
Intermediate	moderate	mild (e.g. self-limiting, complete recovery)	general ward care, isolation: nil / contact / droplets / airborne / reverse	simple / non-invasive procedures (e.g. oxygen therapy, intravenous fluid)
Complex	severe	moderate (e.g. intervention required, short term morbidity but complete recovery anticipated)	HDU / SCBU / ICU / PICU / NICU care requiring intensive monitoring, with or without isolation	specialized / invasive procedures (e.g. chest drain, thoracocentesis, pleural biopsy, bronchoscopy)
Highly complex	life-threatening	severe (e.g. intervention required, only partial recovery or presence of long-term morbidity)	ICU / PICU / NICU requiring ventilatory support, multi-specialty care, or surgical management, with or without isolation	highly specialized procedures (e.g. intubation, ventilation, surgery, plasmapheresis, interventional radiology, ECMO, lung transplant)

* The highest level attained in any domains from A to D will determine the level of complexity categorization

Since disease severity, disease complications, level of care and respiratory procedures are not directly retrievable from the CDARS system, they were indirectly derived as follows. Those diagnostic investigations or therapeutic procedures

obviously not related to the respiratory system were discarded. Some monitoring procedures, e.g. central venous pressure monitoring, infusion of electrolytes (i.e. intravenous fluid), isolation ... etc., were retained, as they were indicative of disease severity or the level of care provided. Plain X-ray examinations were considered as simple investigations. Death cases and those with surgical operations performed were generally counted as highly complex cases.

ICD-9CM Code	Investigation(s) / Procedure(s)	Complexity	Justification
31.42	Laryngoscopy	complex	invasive procedure
33.22(0)	Fibreoptic bronchoscopy	complex	invasive procedure
33.22(1)	Rigid bronchoscopy	complex	invasive procedure
34.04	Insertion of intercostal catheter for drainage / chest drain insertion	complex	invasive procedure
34.09(1)	Thoracotomy with chest drainage	highly complex	surgical procedure in OT
34.24	Pleural biopsy	complex	invasive procedure
34.91	Thoracentesis / Chest tapping	complex	invasive procedure
38.85(7)	Bronchial artery embolisation	highly complex	interventional radiology Rx
38.91(2)	Insertion of peripheral arterial catheter	complex	signify HDU/SCBU/PICU/NICU care
38.91(3)	Insertion of umbilical artery catheter	complex	signify HDU/SCBU/PICU/NICU care
38.93(0)	Venous catheterization	intermediate	general ward care
38.93(1)	Insertion of central venous catheter	complex	signify HDU/SCBU/PICU/NICU care
38.93(2)	Insertion of Lifecath catheter	complex	signify HDU/SCBU/PICU/NICU care
38.93(3)	Insertion of venous catheter	intermediate	general ward care
38.93(4)	Insertion of Hickman's catheter	complex	signify HDU/SCBU/PICU/NICU care
38.93(5)	Subclavian catheter insertion	complex	signify HDU/SCBU/PICU/NICU care
38.93(999)	Central line insertion	complex	signify HDU/SCBU/PICU/NICU care
38.92	Insertion of umbilical venous catheter	complex	signify HDU/SCBU/PICU/NICU care
39.65	Extracorporeal membrane oxygenation (ECMO)	highly complex	signify HDU/SCBU/PICU/NICU care
87.00	X-ray soft tissue of face, head, neck	simple	
87.10	Other X-ray soft tissue of face, head, neck	simple	
87.03	CT head & neck, larynx, nasopharynx, oropharynx	intermediate	non-invasive investigation
87.09	X-ray soft tissues of face, head, neck	simple	
87.16	X-ray head, neck, facial bones	simple	
87.30	X-ray soft tissue of throat	simple	
87.39	X-ray soft tissues of chest wall	simple	
87.41	CT thorax	intermediate	non-invasive investigation
87.43	X-ray ribs, sternum, clavicles	simple	
87.44	Routine chest X-ray	simple	
87.49	Other chest X-ray	simple	

ICD-9CM Code	Investigation(s) / Procedure(s)	Complexity	Justification
87.61	Ba swallow	intermediate	non-invasive investigation
87.62	Upper GI series	intermediate	non-invasive investigation
88.71	USG head & neck	intermediate	non-invasive investigation
88.73	USG thorax, breast, lung	intermediate	non-invasive investigation
88.92	MRI chest, heart, thorax	intermediate	non-invasive investigation
89.17	Polysomnography (PSG)	complex	specialised investigation
89.18(2)	Continuous SpO ₂ monitoring	intermediate	general ward monitoring
89.18(3)	Polysomnography (PSG) with titration study	complex	specialised investigation
89.18(4)	Multiple sleep latency tests (MSLT)	complex	specialised investigation
89.37(0)	Vital capacity determination	intermediate	non-invasive investigation
89.37(1)	Lung function test	intermediate	non-invasive investigation
89.37(2)	Bronchoprovocation test	complex	specialised investigation
89.37(3)	Exercise bronchoprovocation test	complex	specialised investigation
89.37(4)	Bronchoprovocation test with methacholine	complex	specialised investigation
89.37(5)	Spirometry	intermediate	non-invasive investigation
89.37(6)	Cardiopulmonary exercise test	complex	specialised investigation
89.37(7)	Carbon monoxide diffusion capacity test	complex	specialised investigation
89.38(1)	CPAP titration	complex	specialised investigation
89.38(2)	BiPAP titration	complex	specialised investigation
89.39(3)	24 hr oesophageal pH study	complex	specialised investigation
89.54	ECG monitoring	intermediate	general ward monitoring
89.61	Systemic arterial blood pressure monitoring	complex	signify HDU/SCBU/PICU/NICU care
89.62	Central venous pressure monitoring	complex	signify HDU/SCBU/PICU/NICU care
89.64	Pulmonary artery wedge monitoring	complex	signify HDU/SCBU/PICU/NICU care
89.65	Measurement of systemic arterial blood gases	complex	signify HDU/SCBU/PICU/NICU care
89.66	Measurement of mixed venous blood gases	complex	signify HDU/SCBU/PICU/NICU care
92.15	Pulmonary scan	complex	specialised investigation
93.00	Physical therapy, respiratory therapy, rehabilitation and related procedures	intermediate	non-invasive therapy
93.18	Chest physiotherapy	intermediate	non-invasive therapy
93.90	Continuous positive airway pressure (CPAP)	highly complex	signify HDU/SCBU/PICU/NICU care
93.90(1)	Ventilatory support - bilevel positive airway pressure (BiPAP)	highly complex	signify HDU/SCBU/PICU/NICU care
93.94	Respiratory medication administered by nebulizer	intermediate	general ward therapy
93.95	Hyperbaric oxygenation	highly complex	specialised therapy
93.96(1)	Oxygen therapy	intermediate	general ward therapy
93.96(2)	Long term oxygen therapy	intermediate	general ward therapy

ICD-9CM Code	Investigation(s) / Procedure(s)	Complexity	Justification
93.99(2)	Non-invasive mechanical ventilation	highly complex	signify HDU/SCBU/PICU/NICU care
93.99(3)	High frequency oscillatory ventilation	highly complex	signify HDU/SCBU/PICU/NICU care
96.01	Insertion of nasopharyngeal airway	highly complex	resuscitative procedure, signify life-threatening disease severity
96.02	Insertion of oropharyngeal airway	highly complex	resuscitative procedure, signify life-threatening disease severity
96.04	Insertion of endotracheal tube / Endotracheal intubation	highly complex	resuscitative procedure, signify life-threatening disease severity
96.05	Insertion of laryngeal mask	highly complex	resuscitative procedure, signify life-threatening disease severity
96.07	Insertion of nasogastric tube	intermediate	general ward care
96.70	Continuous mechanical ventilation of unspecified duration	highly complex	signify HDU/SCBU/PICU/NICU care
96.71	Continuous mechanical ventilation for less than 96 consecutive hours	highly complex	signify HDU/SCBU/PICU/NICU care
96.72	Continuous mechanical ventilation for 96 consecutive hours or more	highly complex	signify HDU/SCBU/PICU/NICU care
97.41	Removal of chest drain	complex	specialised procedure
99.14	Intravenous immunoglobulin (IVIG) administration	intermediate	general ward therapy
99.18	Injection or infusion of electrolytes	intermediate	general ward therapy
99.21	Injection of antibiotic	intermediate	general ward therapy
99.23	Injection / infusion of steroid	intermediate	general ward therapy
99.25	Injection / infusion of cancer chemotherapeutic substance	intermediate	general ward therapy
99.29(1)	Surfactant therapy	highly complex	HDU/SCBU/PICU/NICU therapy
99.29(2)	Vancomycin infusion	intermediate	general ward therapy
99.29(4)	Injection of streptokinase/urokinase	complex	specialised procedure
99.29(13)	Injection of interferon	intermediate	general ward therapy
99.60	Cardiopulmonary resuscitation	highly complex	resuscitative procedure, signify life-threatening disease severity
99.71	Plasmapheresis	highly complex	HDU/SCBU/PICU/NICU therapy
99.84	Isolation	intermediate	general ward care
99.99(5)	Skin prick test for allergens	intermediate	general ward investigation
99.99(11)	Mantoux test for tuberculosis	intermediate	general ward investigation

Calculations were then made to estimate the number and percentages of simple, intermediate, complex and highly complex respiratory cases each year for 2008-2012, the 5-year total and the yearly average. Since there was no explicit identifier for simple cases, the number of simple cases was worked out by subtracting the number of cases with intermediate / complex / highly complex procedure codes (classifiable codes) and the number of death cases from the total number of cases in that year.

Total number with respiratory code as principal diagnosis		2008		2009		2010		2011		2012		5-year Total		Yearly Average	
		HC	Epi	HC	Epi	HC	Epi	HC	Epi	HC	Epi	HC	Epi	HC	Epi
Total discharges	A	16481	18808	18404	20662	19830	22824	17768	20721	20237	23237	92720	106252	18544	21250.4
Total deaths	B	16	16	16	16	20	20	19	19	16	16	87	87	17.4	17.4
Total discharges and deaths	C	16497	18824	18420	20678	19850	22844	17787	20740	20253	23253	92807	106339	18561.4	21267.8
Total no. with classifiable codes	D=F+G+H	5219	5456	9754	10237	10113	10834	8968	9729	6765	7436	40819	43692	8163.8	8738.4
Simple cases (no.)	E=A-D	11262	13352	8650	10425	9717	11990	8800	10992	13472	15801	51901	62560	10380.2	12512
Intermediate cases (no.)	F	3463	3576	7342	7650	7394	7664	5975	6339	4042	4260	28216	29489	5643.2	5897.8
Complex cases (no.)	G	970	1011	2117	2259	2317	2615	2596	2914	2342	2670	10342	11469	2068.4	2293.8
Highly complex cases (no.)	H	786	869	295	328	402	555	397	476	381	506	2261	2734	452.2	546.8
Highly complex + death cases (no.)	I=B+H	802	885	311	344	422	575	416	495	397	522	2348	2821	469.6	564.2
Simple cases (%)	E/C	68%	71%	47%	50%	49%	53%	49%	53%	67%	68%	56%	59%	56%	59%
Intermediate cases (%)	F/C	21%	19%	40%	37%	37%	34%	34%	31%	20%	18%	30%	28%	30%	28%
Complex cases (%)	G/C	6%	5%	11%	11%	12%	11%	15%	14%	12%	11%	11%	11%	11%	11%
Highly complex + death cases (%)	H/C	5%	5%	2%	2%	2%	3%	2%	2%	2%	2%	3%	3%	3%	3%

There were a number of limitations in the present estimation:

1. Inaccurate or incomplete coding into the CDARS data, hence underestimation of actual case loads even for in-patients.
2. Multiple procedures on same patient or single episode were possible; hence it was an illustrative approximation rather than a true percentage estimation of different case complexities.
3. Information on level of care was scarce. They were mostly indirectly inferred from the monitoring procedures coded.
4. Captured data were those with respiratory cases coded as principal diagnosis only. Respiratory problems as part of other diseases (e.g. pulmonary haemorrhage in systemic lupus erythematosus) or as their complication (e.g. respiratory distress syndrome in prematurity) might not be included. Extending the CDARS search criteria using "first 3 diagnoses" or "any diagnosis" might help to recruit these cases but would greatly expand the data volume yet making it more heterogeneous.
5. Other than death cases which could be counted into the highly complex case category, there were few reliable parameters in CDARS system to reflect mild / moderate / severe / life-threatening disease. Similarly, there were no good handles to tell disease complications or extent of recovery.
6. Separate CDARS searches were conducted to estimate respiratory problems outside the ICD-9CM diagnostic codes range 460-519 (respiratory system) to study for neonatal respiratory diseases, sleep-related disorders, other specific respiratory problems, diagnostic investigations and therapeutic procedures.

Specific Diseases and Procedures

Neonatal Respiratory Diseases:

Principal Diagnosis		IP Discharges and Deaths, by Episodes*						
ICD-9CM Code	Diagnosis Description	2008	2009	2010	2011	2012	5-Year Total	Yearly Average
769	Respiratory Distress Syn	70(69)	62	77	49	63	321 (320)	64.2 (64)
770.1	NB Meconium Aspirat Syn	57	95	84	74	91	401	80.2
770.6	NB Transitory Tachypnea	399	644	680 (678)	742	657	3122 (3120)	624.4 (624)
770.7	Bronchopulm Dysplasia	19(15)	10(8)	10(9)	11(10)	11(10)	61 (52)	12.2 (10.4)
770.8	Other NB Resp Prob	259	317	283 (282)	274	397	1530 (1529)	306 (305.8)
Grand Total :		804	1128	1134	1150	1219	5435	1087

*Figures in bracket are headcounts

Congenital Anomalies of Respiratory System:

Principal Diagnosis		IP Discharges and Deaths, by Episodes*						
ICD-9CM Code	Diagnosis Description	2008	2009	2010	2011	2012	5-Year Total	Yearly Average
748.0	Choanal atresia	1	0	0	1	4	6	1.2
748.1	Congenital NOSe anomaly	0	0	0	1	1	2	0.4
748.2	Laryngeal web	0	0	1	1	2	4	0.8
748.3	Laryngomalacia, tracheomalacia, bronchomalacia	76 (63)*	66 (57)*	67 (58)*	46 (40)*	71 (63)*	326 (281)*	65.2 (56.2)*
748.4	Congenital cystic lung	0	7	5	4	9 (7)*	25 (23)*	5 (4.6)*
748.5	Lung hypoplasia, agenesis, sequestration	5 (3)*	5	8	9 (8)*	5	32 (29)*	6.4 (5.8)*
748.6(0)	Congenital lung anomaly NOS	2	2	0	2	2 (1)*	8 (7)*	1.6 (1.4)*
748.6(9)	Cystadenomatoid malformation, accessory lobe	1	6 (5)*	12	13 (11)*	7 (6)*	39 (35)*	7.8 (7)*
748.8	Congenital chylothorax, hydrothorax, mediastinum cyst	1	3	5 (4)*	6 (4)*	5	20 (17)*	4 (3.4)*
Grand Total :		86	89	98	83	106	462	92.4

*Figures in bracket are headcounts

Pulmonary Tuberculosis

Principal Diagnosis		IP Discharges and Deaths, by Episodes*						
ICD-9CM Code	Diagnosis Description	2008	2009	2010	2011	2012	5-Year Total	Yearly Average
011	Pulmonary TB	38(37)	38(35)	40	28(27)	29(28)	173 (167)	34.6 (33.4)

*Figures in bracket are headcounts

Sleep Apnea

Principal Diagnosis		IP Discharges (Episodes), no deaths						
ICD-9CM Code	Diagnosis Description	2008	2009	2010	2011	2012	5-Year Total	Yearly Average
780.51	Insomnia w Sleep Apnea	0	0	0	0	0	0	0
780.53	Hypersomnia w Sleep Apnea, OSAS	552	483	489	529	493	2546	509.2
780.57	Other Unspecified Sleep Apnea	14	13	5	5	7	44	8.8
Grand Total :		566	496	494	534	500	2590	518

*Figures in bracket are headcounts

Narcolepsy

Principal Diagnosis		IP Discharges and Deaths, by Episodes*						
ICD-9CM Code	Diagnosis Description	2008	2009	2010	2011	2012	5-Year Total	Yearly Average
347	Cataplexy & Narcolepsy	8 (5)*	2	1	3 (2)*	4	18 (14)*	3.6 (2.8)*

*Figures in bracket are headcounts

Pleural Procedures:

Any Procedure		IP Discharges by Episodes*						
ICD-9CM Code	Procedure Description	2008	2009	2010	2011	2012	5-Year Total	Yearly Average
34.04	Chest drain insertion	66 (65)	76 (75)	73 (73)	81 (80)	67 (67)	363 (360)	72.6 (72)
34.24	Pleural biopsy	3 (3)	2 (2)	3 (3)	1 (1)	0	9 (9)	1.8 (1.8)
34.91	Thoracocentesis	31 (29)	30 (29)	43 (42)	32 (31)	39 (34)	175 (165)	35 (33)
34.6(1)	Pleurodesis	1 (1)	2 (2)	2 (2)	0	2 (2)	7 (7)	1.4 (1.4)
34.92(2)	Pleurodesis, chemical	4 (3)	7 (7)	1 (1)	4 (4)	4 (4)	20 (19)	4 (3.8)
34.92(3)	Instillation of intrapleural fibrinolytics	3 (3)	3 (3)	2 (2)	6 (6)	9 (9)	23 (23)	4.6 (4.6)
Grand Total :		108 (104)	120 (118)	124 (123)	124 (122)	121 (116)	597 (583)	119.4 (116.6)

*Figures in bracket are headcounts

Endoscopic Procedures:

Any Procedure		IP Discharges (Episodes)						
ICD-9CM Code	Procedure Description	2008	2009	2010	2011	2012	5-Year Total	Yearly Average
29.11	Pharyngoscopy, nasopharyngoscopy, fiberoptic or rigid endoscopic examination of nasopharynx, panendoscopy of respiratory and upper GI tract	1	2	9	4	3	19	3.8
33.21	Bronchoscopy through artificial stoma	4	3	0	2	2	11	2.2
33.22	Fiberoptic bronchoscopy	107	81	101	113	102	504	100.8
33.23	Other bronchoscopy	59	67	84	78	82	370	74
33.24	Endoscopic (closed) biopsy of bronchus	1	2	11	21	22	57	11.4
33.26(3)	Endoscopic ultrasonography of lung with biopsy	0	0	0	0	0	0	0
33.27(1)	Bronchoscopic biopsy under fluoroscopic guidance	0	0	0	0	0	0	0
33.27(2)	Fiberoptic bronchoscopy with biopsy of lung	0	0	0	0	0	0	0
Grand Total :		172	155	205	218	211	961	192.2

Sleep-related Procedures:

Any Procedure		IP Discharges by Episodes (Headcounts in bracket), no deaths						
ICD-9CM Code	Procedure Description	2008	2009	2010	2011	2012	5-Year Total	Yearly Average
31.42(3)	Sleep Endoscopy	34	42	29	41	53	199	39.8
89.17	Polysomnogram	585	441	434	541	547	2548	509.6
89.18(0)	Sleep Disorder Function Tests	2	1	0	0	1	4	0.8
89.18(1)	Sleep study	456	500	429	363	395	2143	428.6
89.18(2)	Continuous SpO2 monitoring*	2583	4400	4525	4391	4541	20440	4088
89.18(3)	Titration Study	2	3	0	2	1	8	1.6
89.18(4)	Multiple sleep latency test	2	5	1	4	1	13	2.6
89.38(1)	CPAP Titration	19	46	26	56	54	201	40.2
89.38(2)	BIPAP Titration	19	29	41	35	38	162	32.4
Grand Total (excluding 89.18(2))*:		1119	1067	960	1042	1090	5278	1055.6

*Overnight oximetry study cannot be further dissected out easily from this code 89.18(2)

Ventilation Support (for respiratory principal diagnosis):

Any Procedure		IP Discharges and Deaths, by Episodes*						
ICD-9CM Code	Procedure Description	2008	2009	2010	2011	2012	5-Year Total	Yearly Average
93.90	CPAP, BiPAP	92 (73)	129 (109)	250 (181)	211 (165)	197 (144)	879 (672)	175.8 (134.4)
93.91	IPPB	24 (24)	27 (27)	32 (31)	22 (22)	29 (27)	134 (131)	26.8 (26.2)
96.70	Mechanical Ventilation – time NOS	34 (34)	47 (46)	21 (21)	24 (22)	17 (16)	143 (139)	28.6 (27.8)
96.71	Mechanical Ventilation < 96hrs	6 (6)	32 (23)	93 (47)	70 (51)	106 (54)	307 (181)	61.4 (36.2)
96.72	Mechanical Ventilation ≥ 96hrs	6 (6)	28 (25)	74 (52)	66 (59)	66 (52)	240 (194)	48 (38.8)
Grand Total :		162 (143)	263 (230)	470 (332)	393 (319)	415 (293)	1703 (1317)	340.6 (263.4)

*Figures in bracket are headcounts

Extracorporeal Circulatory Procedures (for respiratory principal diagnosis) :

Any Procedure		IP Discharges and Deaths, by Episodes*						
ICD-9CM Code	Procedure Description	2008	2009	2010	2011	2012	5-Year Total	Yearly Average
39.61	Cadiopulmonary bypass	0	0	3(3)	0	2(2)	5	1
39.65	ECMO	0	0	1(1)	0	2(2)	3	0.6
39.95	Haemodialysis, haemofiltration, CAVH(D), CVVH(D)	0	1(1)	3(3)	6(6)	2(2)	12	2.4
99.71	Plasmapheresis	0	0	0	0	0	0	0
Grand Total :		0	1(1)	7	6(6)	6	20	4

*Figures in bracket are headcounts

Conclusion

The above synopsis is an illustrative estimation of paediatric respiratory in-patient caseload and casemix in all HA hospitals with paediatric services by a broad-brush approach. In real clinical practice, there is collaboration and joint care often shared amongst the general paediatrician, neonatologist, paediatric intensivist and paediatric respiratory medicine (PRM) subspecialist as demarcation of case complexity is indistinct and there could often be overlap between case categories, particularly between simple and intermediate cases. It was thought that the PRM subspecialist would manage only about 50% of the intermediate cases, while complex and highly complex cases should definitely be managed by the PRM subspecialist. Therefore, assuming 50% of the intermediate cases, i.e. about 2900 intermediate cases, together with 2300 complex and 560 highly complex cases see the PRM subspecialist, the estimated yearly in-patient clinical case load is over 5500, not yet counting out-patient attendances, consultations, patient education and community involvement, continuous professional development, teaching and research activities.